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The Citrus Industry
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Representing no special interest

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The Citrus Situation...

H. G. HAMILTON
Professor of Marketing College of Agriculture University of Florida*

There are many angles to the citrus situation, but most of them can be grouped under four or five classifications—such as supply, demand, interrelation of supply and price, marketing, Governmental programs, and problems of the individual.

Supply

In the decade of the twenties world production of oranges averaged approximately 120 million boxes, and Florida approximately 10-1/2 million boxes. In the decade of the thirties world production averaged about 190 million boxes. United States production 60 million boxes and Florida production 21 million boxes. For the last five years world production has averaged approximately 230 million boxes, United States production 106 million boxes, and Florida production 50 million boxes.

From 1920 to 1935 most of the important world producing countries, except Spain, increased their production of oranges faster than the United States. From 1936 to 1946, because of wars and disease, production of oranges has not increased in any important orange producing country except the United States and Mexico. The increase has been much greater in Florida than in any other area.

In 1926-27 the United States produced approximately 31 percent of the world's oranges, in 1936-37 only 28 percent, but in 1946-47 about 51 percent. The dominant role Florida is acquiring in the United States and the world orange industry is shown in the following percentages: Florida produced in 1926-27 about 9 percent of the world's total production, and about 28 percent of the production of the United States. In 1936-37 Florida produced about 11 percent of the world's oranges and about 41 percent of the oranges produced in the United States. In 1946-47 Florida produced about 22 percent of the world's oranges ond 47 percent of the oranges of the United States.

In the case of grapefruit, the United States produced, in the 1924-25 season, only 10 million boxes, which was 90 percent of the world's grapefruit. At this time (1924-25) Florida was producing about 80 percent of the world's production. In 1935-36 the United States produced 18 million boxes which was 88 percent of the world's production; and in 1946-47 the production of the United States was 62 million boxes, which was 95 percent of the world's production.

As compared to deciduous fruit production in the United States, bushel for bushel, orange production is about 1-½ times the production of apples, about 2 times that of peaches, and about 5 times that of pears. Grapefruit production, bushel for bushel, is 4/5 that of apples, slightly more than that of peaches, and almost 3 times that of pears.

Estimates of the United States or Florida production of oranges several years in the future have been, in most cases, entirely too low. No one can forsee wars, diseases, or price changes, or tell the effect these things will have on the production of oranges or grapefruit. It is my understanding that the bearing surface of orange trees in Florida is increasinng at the rate of 5.7 percent per year and that of grapefruit 3.5 percent per year; however, crops cannot be forecast by projecting this percentage into the future.

If prices and political conditions will permit, there will no doubt be a marked increase in the production of citrus fruit in the next few years in all important citrus producing countries, except for South American countries where disease is causing great damage. It is probable that those countries which have had their production adversely affected by the war will recover their production by the time demand for citrus can be restored in Europe.

Demand

The per capita consumption of fresh oranges is very large—approximately 1.6 times as great as that

*Delivered before the Florida State Horticultural Society, October 29, 1947.

of apples, 2 times that of bananas, 2 times that of peaches, 5 times that of pears, and 6 times that of grapes. Fresh grapefruit consumption is about 1/2 that of fresh apples, 2/3 that of bananas, only slightly less than that of peaches, and 1/3 more than that of pears.

The trend in the per capita consumption of citrus juices is still sharply upward; especially is this

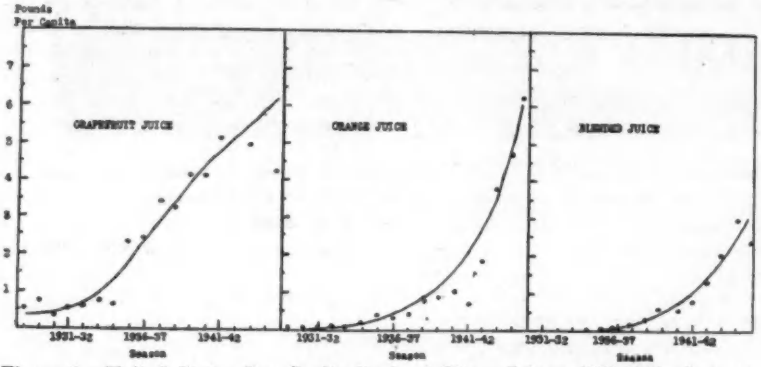

Figure 1.—United States Per Capita Pack of Citrus Juices, 1929-1946. Source: Hamilton, H. G. Trends in The Processing Industry. Paper delivered before the Citrus Institute at Camp McQuarrie, Florida, August 27, 1947.

true for oranges. In case of grapefruit juice, there is a tapering off of the rate of increase in the per capita consumption (Figure 1). The consumption of all citrus juices is approxiamtely at the same level as that of tomato juice and of all other fruit juices combined. The rising trend in the per capita consumption of citrus juices is decidedly greater than for other juices (Figure 2). Because the cost of marketing citrus juice is less than for fresh citrus products (for equivalent food value), the increased trend in citrus juice consumption may be expected to continue its upward trend for some time.

The possibility for increased use of canned citrus segments should not be overlooked. In Figure 3 is given the per capita pack of peaches, pineapples, pears, apples and grapefruit. It will be observed that the per capita pack of grapefruit is very low as compared to that of other fruits. Orange segments are, of course, only beginning to appear on the market. Because orange and grapefruit segments compete very little with canned juices or fresh fruit this is a fertile field for expansion. The volume of citrus juices packed is approximately as great as that of tomato juice and all other juices, but the pack of citrus segments is only 5 percent of the total fruit packed. Should citrus segments become relatively as important as citrus juices there would be a market for an additional 50 to 60 million boxes. Perhaps it is too optimistic to expect such a large place for citrus in the canned fruit market; but half this much, or 25 million boxes, seems a conservative goal. High cost of processing segment fruit is an adverse factor in obtaining greater production.

The trend in production and consumption concerns us because of the bearing on price. The price of Florida oranges in the past has been determined largely by the supply of United States oranges, the disposable incomes of consumers and competiing commodities. From

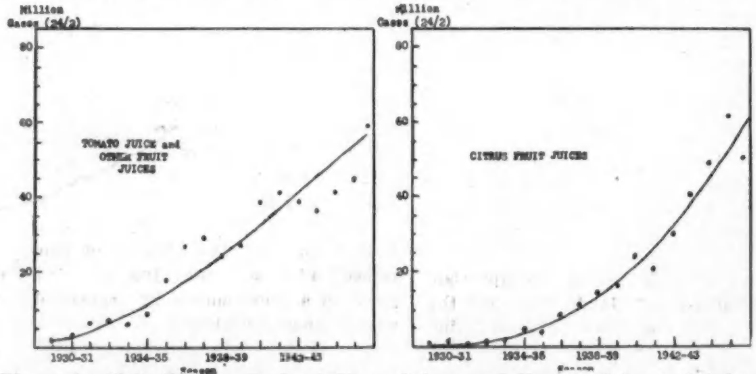

Figure 2.—United States Pack of Citrus Juices, and Tomato Juice and Other Fruit Juices. Source: Hamilton, H. G. Trends in The Processing Industry. Paper delivered before the Citrus Institute at Camp McQuarrie, Florida, August 27, 1947.

1937 to 1946 a change in the United States supply of oranges by one-million boxes was associated with a reverse change in price of approximately 2-½ cents per box. From 1937 to 1946 a change of disposable income of individuals of one-billion dollars was associated with a corresponding change in price of approximately 3-1/2 cents per box. The low prices in 1946-47 we believed to have been due to reappearance of competiting commodities on the quantity and carry-over of the processed products. Over long periods of time it is necessary to adjust for increase in population and the increased trend in demand to account for all the factors affecting price. But for short periods of time these factors may be ignored without great error.

Dr. Wellman, of California, showed several years ago that when adjustments were made for disposable income, a given supply of oranges would sell for a higher price per box with the passing of time. This he attributed, and rightly so, to the upward trend of demand. His data show a decided flattening out of the demand pattern since the year 1930. That is to say, the rate of increase in demand, when adjusted for disposable incomes, is slowing down. In fact, it may be that in the case of winter oranges the rate of increase in demand for fresh oranges has ceased to be a factor and that the saturation point has been reached.

Close observers in Florida are aware that for the past 10 or 12 years there has been no increase in the Florida shipments of fresh grapefruit. The indications are that the demand for fresh grapefruit, when adjusted for changes in disposable incomes, has about reached the saturation point.

Should disposable income be reduced greatly, without question the price of oranges will fall at the rate of about 3-1/2 cents per box for each billion dollars fall in disposable income. The fall in grapefruit price will be at the rate of about 2 cents per box for each billion dollars decrease in income. Because the trend of increased de-

(Continued on page 11)

Experiments On Production Of Feed Yeast From Citrus Press Juice

M. K. VELDHUIS & W. O. GORDON
U. S. Citrus Products Laboratory(1), Winter Haven, Fla., and Southern Regional Research Laboratory(2), New Orleans, La.,
At Meeting Florida State Horticultural Society

The Citrus Products Laboratory at Winter Haven, Florida, has been interested for several years in the production of feed yeast from the press juice obtained in the manufacture of dried pulp from citrus peel. In 1942 Nolte, von Loesecke and Pulley (1) published the results of their investigation in an article entitled "Feed Yeast and Industrial Alcohol from Citrus Press Juice." In their work a batch system was used which was somewhat slow in operation, but they did demonstrate that this raw material was suitable for the production of yeast and they obtained information on the composition of the press juice and yeast.

At the Southern Regional Research Laboratory of the Bureau of Agricultural and Industrial Chemistry, New Orleans, Louisiana, the Sweetpotato Products Division had encountered a similar situation on the utilization and disposal of some liquors obtained during the manufacture of starch from sweet potatoes. They had been investigating the possibilities of making yeast from these liquors and had developed a continuous method of conducting the fermentation (3). They had also constructed a pilot plant capable of handling up to 200 gallons per hour of waste liquor for demonstrating the process (4). It appeared that this method showed excellent possibilities of adaptation to the manufacture of yeast from citrus press juice. A cooperative project was arranged with the Dr. P. Phillips Canning Company, Orlando, Fla., and the pilot plant was installed in a building adjacent to their cannery and feed mill. A similar laboratory experiment unit with the propagator capacities of six gallons each was installed at the U. S. Citrus Products Station, Winter Haven, Fla.

In this discussion the term "feed yeast" is used, and some explanation of what is meant may be in order. The investigations were limited to the production of a grade of yeast suitable for feeding animals. The organism used was **Torula utilis**, one of the wild yeasts, which is fast growing and not as susceptible to contamination as the true yeasts. One might ask what particular value yeast would have in feeding. It is good for this purpose because of its high protein and vitamin contents. About half of the yeast is composed of high-quality protein, which is readily available to animals. The proteins in yeast are deficient in only one of the ten so-called essential amino acids, methionine. This deficiency can be corrected by addition to the diet of any of a number of cereals.

The yeast is high in the B vitamins, particularly B1 (thiamin) and B2 (riboflavin.) Values of 1.4 to 2.7 mg. thiamin per 100 grams of yeast have been reported and a sample made in the current studies contained 2.9 mg. per 100 g. For riboflavin, values of 5.2 to 9.1 mg. per 100 g. of yeast have been reported and a sample made in the pilot plant contained 4.54 mg. per 100 g. The yeast is a good source of ergosterol which, upon irradiation, yields calciferol, one of the compounds showing vitamin D activity (D2). A sample of the yeast produced in these experiments contained about one-half of one percent of ergosterol. It is extracted commercially from a yeast of particularly high content of this compound. Significant quantities of niacin and pantothenic acid are also present.

The Medical Research Council in England in 1945 (2) published a review of some investigations on the yeast in the diet of humans and animals entitled "Food Yeast, A Survey of the Nutritive Value." The following is quoted from this publicatton:

"The results of the above experments with animals show that the addition of food yeast greatly improves the nutritive value of a diet whose protein is otherwise derived mainly from cereals, the biological value of the mixture of the cereal proteins with those of yeast being equal to that of a similar mixture with those of milk. The goodeffects of the addition of food yeast to a white flour diet have demonstrated its value as a source of B vitamins."

In Germany during World War II several plants were erected for producing yeast from wood sugar and the yeast was used in preparing "ersatz" foods.

The press juice from the citrus feed mill offers many advantages for the production of feed yeast. The juice is rich in carbohydrates which can be utilized in the growth of yeast. It is available at centralized points in sufficient quantities to make large scale production possible, and at sufficiently uniform rates to permit continuous operation. The manufacture of yeast would not require the expensive vacuum concentration necessary for the manufacture of molasses; it is ready for use as it is. When the liquor is used for the manufacture of yeast its biological oxygen demand (B. O. D.) is greatly reduced, and this simplifies disposal of the resulting effluent.

Accurate records of the amounts of press juice obtained in the citrus feeds mills are generally not maintained, but an approximation of the amount and the possible yield of yeast can be made. It is estimated that a 90-pound box of citrus fruit will yield about three gallons of press juice of approximately 10 per cent soluble solids. From this three gallons, about a pound of dried yeast can be produced. Potential total production might be as much as 25,000 tons per year.

During the war it was profitable to concentrate the citrus press juice into a molasses or sirup in multiple-effect vacuum evaporators. The product was used in the compounding of mixed feeds. With the return of more normal times competition with with blackstrap molasses is to be ex-

1. Agricultural Chemical Research Division Contribution No. 222.
2. Laboratories of the Bureau of Agricultural and Industrial Chemistry, Agricultural Research Administration, U. S. Department of Agriculture.

pected and additional uses for the press juice are desirable. The strength of the press juice makes it impossible to dispose of it in sewers, lakes or other bodies of water in most locations. It must be treated or processed in some manner.

In this discussion it will not be possible to describe the pilot plant in detail, but the general method of operation can be given.

The juice pressed from the ground, limed, citrus peel was pumped from the feed mill to the yeast pilot plant without any treatment. In the pilot plant it was first passed through an 80-mesh vibrating screen to remove the particles of suspended matter that might later clog pipe lines, screens, or the nozzles of the yeast centrifuge. It is expected that the small amount of suspended matter remaining in the juice will later be collected with the yeast by the high-speed yeast centrifuge, but it is not objectionable in the feed.

The juice was then pumped through a heater to a large storage tank and held at 140° F. to prevent premature fermentation and destruction of the sugars. This supply tank was necesary because the feed mill was shut down for a few hours during the night while the yeast pilot plant operated continuously. From the storage tank the juice was pumped through a pasteurizer where it was heated to 200° F. to destroy microorganisms, then through a cooler to where it was cooled to approximately room temperature, and then directly into the yeast propagators. Concentrated nutrient solution was also pumped continuously to the propagator in a quantity proportioned to the feed rate of the press juice. The nutrient solution contained the phosphate and ammonium salts necessary for yeast growth.

Three yeast propagators, each capable of holding about 500 gallons of liquid, were arranged in series so that the liquid flowed successively through them. Porous aeration tubes in the bottom of each propagator provided the continuous flow of air necessary for rapid yeast growth. The propagators were fitted with cooling coils for dissipation of the heat generated by the fermentation, and temperatures were maintained at about 96° F.

In the yeast propagators the yeast multiplied and utilized the carbohydrates and other nutrient materials. Since the plant operated continuously, a suspension of yeast discharged continuously from the system. This yeast suspension was pumped to a collecting tank and thence to a continuous centrifuge. This special type of centrifuge discharged the yeast as a thick slurry suitably cencentrated for drying on a steam-heated double drum drier.

The large pilot plant was placed in operation as follows:

The propagators and all connecting lines were sterilized with flowing steam, and 200 gallons of pasteurized press juice and the necessary nutrients were pumped into the first propagator. Aeration had been started as soon as the steam was turned off. In the course of six to eight hours, 200 gallons of an active culture were built up. Approximately 200 gallons more of pasteurized press juice and nutrients were then added, and about two hours allowed for the culture to build up before continuous flow of press juice was started and maintained. No new culture was added from this point on.

During operation determinations were made of yeast counts, yeast volume, yeast weight, pH, phosphates, ammonia nitrogen, total organic matter, sugars utilized and oxygen consumed. B. O. D. values of the effluent and observations on the amounts of liquid in each propagator and gas analyses of the air coming from the propagators were also made.

The pilot plant was first placed in operation at Orlando in May and June, 1946. At the beginning trouble was encountered with foaming and it was evident that unless this difficulty were overcome, the method would not be practical. At times half the liquid and yeast were lost through the air vents in the tops of the propagators. An antifoam mixture was used which is still considered good, but even with large amounts of it, the foaming was not adequately controlled. During the latter part of this period a system of eight-inch pipes was installed at the tops of the propagators which conducted the foam from the first propagator to the second, the second to the third, and finally to the yeast collecting tank. The air vents used previously were closed. This modification was found to work very well and solved this problem. Not only was the foam kept within bounds, but it eliminated the necessity for antifoam mixture during continuous operation. The propagators remained reasonably full of liquid. Since then, this system has proved itself over an extended period of operation.

Experimental work with the pilot plant at Orlando was resumed in March, 1947, and continued for a period of three weeks. The Dr. P. Phillips Canning Company then operated the pilot plant for a short time and produced additional quantities of yeast. The smaller experimental unit in Winter Haven was operated during April, May and June.

The results of all the experimental operations on feed yeast will be summarized briefly:

It was found that the continuous method of propagating yeast as developed by the Sweetpotato Products Division of the Southern Regional Research Laboratory was adaptable to citrus press juice. Continuous operation, twenty-four hours a day, has been maintained without apparent decrease in the activity of the culture for periods as long as a month. The results indicate the propagation can be continued almost indefinitely wthout any new culture. Experience in operation on citrus waste liquor to date indicates that three stages of propagation may not be required to obtain satisfactory yields. One stage should be sufficient and certainly not more than two stages. With a single-stage system the air required and the cost of the plant will be less. The total detention time in a single-stage plant would be only about three hours.

Ammonium sulfate and tri-sodium phosphate were found to be satisfactory as sources of nitrogen and phosphorus. Other compounds of ammonia and phosphate can doubtless be used as long as the proper ratios are maintained and the proper alkalinity furnished for pH control. It was found that the pH could be maintained in the proper range between 4 and 5 by the addition of the nutrient used.

The maximum feed rate for the large pilot plant was approximately 185 gallons per hour. This means that the liquid remained in each propagator less than three hours. Higher rates of feed resulted in the incomplete utilization of the sugars and low yields. Yields of 60 per

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cent of yeast resulted when the press juice was diluted with two volumes of water. With full-strength press juice yields of 33 per cent were obtained, based on the weight of sugar present. Perhaps with some modification the higher yields obtained by diluting the juice can be realized with full-strength press juice, but this has not been accomplished to date.

In describing the plant operation, it was mentioned that the press juice was pasteurized by heating to 200° F. This is considered advisable while a new culture is being developed in the propagator, but it was found that successful operation could be maintained without pasteurizing the press juice fed to the plant after continuous operation had been established. The organism, **"Torula utilis,"** appears to outgrow the few other organisms that may be present. Generally the citrus pulp is heated before it is pressed and this greatly reduces the number of initial micro-organisms. It is fortunate that pasteurizing is not necessary because the press juice rapidly deposits a scale when heated in a heat exchanger and frequent cleaning is necessary.

Yeast was produced with as little as 500 cubic feet of air per pound of yeast. Experiments are not complete on this point and it may be possible to use less air than this. In the commercal manufacture of compressed yeast by the batch system, the amount of the air used per pound of yeast produced generally exceeds 1200 cubic feet.

It was found that the peel oil present in the press juice did not interfere with the propagation of yeast. These volatile oils were reduced to negligible amounts by the air blown through the propagators.

During passage through the propagators approximately 95 per cent of the sugars were utilized, about 65 per cent of the total organic matter was destroyed, the reduction in the B. O. D. was about 80 per cent and the reduction of the oxygen consumed value was about 75 per cent. This is considered efficient operation because it is not to be expected that the yeast could utilize all different types of organic compounds present.

The centrifuge which is commonly used with the compressed yeast was found to be suitable for separating the **Torula utilis** as a thick slurry. The drum driver operated in a satisfactory manner in producing dried yeast. The product was fluffy, light in color and could easily be ground to a fine powder. It has a characteristic yeast flavor and was slightly bitter, due to the small amount of the residual citrus press juice dried with the yeast.

Most of the information needed to design a commercial plant has been obtained. Experimental work on certain phases will be continued.

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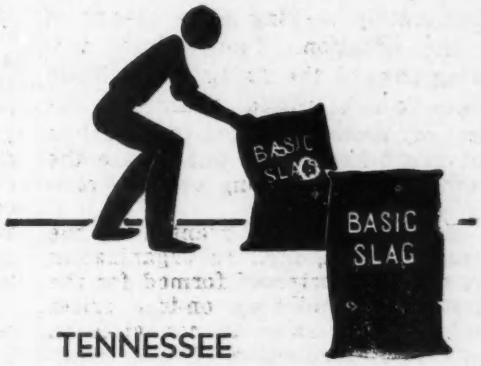
Winter clovers, oats, rye and other grazing will provide much needed feed for farm animals during the months ahead.



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WOULD ESTABLISH MINIMUM PRICE

Faced with a price situation under which growers of Florida citrus fruits are receiving in many instances less than the actual cost of production, growers and other citrus interests are desperately seeking some means of remedying the situation. Two definite proposals looking toward the fixing of minimum on-tree prices which would guarantee the grower cost of production and at least a modicum of profit have been put before the growers, both proposals coming out of Frostproof.

A state charter has been granted to the Florida Citrus Growers, Inc., an organization of citrus growers at Frostproof formed for the purpose of trying to build up on-tree prices of fruit and stopping sales to canneries at prices below cost of production. This is strictly a growers' organization and is headed by Ray Chapman of Frostproof, with Senator Raymond Sheldon of Tampa handling the legal phases of the organization. The primary object of the organization is stated to be to "get a decent price for our fruit."

While the charter provides for the buying and distribution of grower supplies and numerous other activities, it is stated that there is no present purpose of entering into any activities other than the establishment of "floor" prices below which the fruit of members would not be sold. Tentative "floor" prices which the organization considers fair are 55 to 60 cents for grapefruit and $1.10 to $1.25 for oranges on the tree.

Under this plan the state would be divided up into districts and members from each district would elect a representative to the board of governors which would formulate policies according to the organization's by-laws. The membership in the organization would be limited to actual growers.

The second plan is one suggested by Lat Maxcy, prominent grower, packer and shipper of citrus fruits with headquarters at Frostproof. Maxcy's plan has been submitted to the Florida Citrus Commission, of which he is a member, and has been explained to other factors in the industry.

Under this plan also a minimum price scale would be established, fruit quality for out of state shipment would be controlled, a cost-of-production fund would be provided to protect the grower against loss on fruit which fails to come up to the prescribed standard for interstate shipment.

The plan provides for a chartered organization which would include growers, canners and fresh fruit shippers. There would be a board of governors with power to set a minimum floor on the sale price of all fresh and canned products of the industry. It is proposed that this board of governors would be composed of leaders of all phases of the industry, and would have the power to set a reasonable cost of production price and a reasonable profit, which would be the minimum price at which the fruit might be sold. There would be no restriction on the sale of fruit at prices above the minimum scale. Fines would be provided for sale below the minimum set.

A committee of six was first appointed by the Florida Citrus Commission to study and formulate the plan suggested by Mr. Maxcy, and later this committee was increased by the addition of twenty-one more members, representing every phase of the industry — growers, packers, shippers, canners, cooperatives and other grower organizations. This committee of twenty-seven representatives of every branch of the industry will study the situation from every standpoint and will then report to the Citrus Commission and proceed to secure a charter and begin to function.

It has been stated by some members of the recently organized Citrus Canners League of Florida that the cooperation of that organization might be expected. Murl E. Pace, general manager of the United Growers and Shippers Association, and J. Adams Bruce, president of Bruce's Juices, have given their tentative support of the plan suggested by Mr. Maxcy. Other citrus leaders who were present at the meeting of the Florida Citrus Commission when the Maxcy plan was outlined spoke favorably of the suggestion and indicated that they and their organizations would go along with such an organization.

Certainly there has been no such spirit of unrest among citrus growers as has been evident during the present shipping season with its wholly unsatisfactory prices. The solution of the present unsatisfactory situation, it appears to us, lies in all elements of the industry getting together as suggested in last month's issue of this magazine, forgetting past differences and uniting all elements in the industry in one great organization of sufficient strength to bring results. But first, there must be unity of action.

Of the two propositions, it appears to us that the Maxcy suggestion, bringing together all the elements of the industry, is the one which promises greatest benefits to the growers. Certainly without unity of purpose and unity of action of all concerned, the industry will find itself as it has done so often heretofore—hopelessly divided because of each element pulling against the other.

THE CITRUS SITUATION

(Continued from page 6)

mand with passing of time for fresh oranges and grapefruit has flattened out, we cannot expect an increase in price with passing of time when disposable incomes and supply remain constant, as in the past. However, because the juice market has not reached the saturation point it is believed that the increased rate of demand for citrus juices and canned segments might go far over a period of the next few years in relieving the effects of increased supplies.

The Interrelation of Supply and Price

Price analyses usually show the effect of supply on price. Too often the effect of price on future supply is not studied. Forecasts of future supply have been attempted

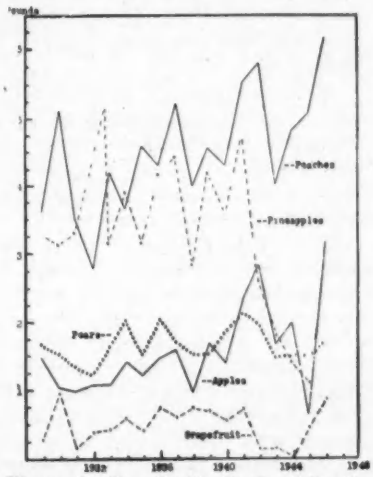

Figure 3—Per Capita Pack of Fruits, 1929 to 1946. Source: Hamilton, H. G. Trends in The Processing Industry. Paper delivered before the Citrus Institute at Camp McQuarrie, Florida, August 27, 1947.

on the basis of acreage of bearing grove, length of life of tree, young groves already planted or the rate of planting of groves; or, arriving at the rate of increase in bearing surface of groves and projecting this into the future. It is well that we have such analyses, and far be it from me to belittle them. However, in our opinion a more realistic approach would be to try and analyze the effect of price on supply.

There is a fairly positive correlation between price and planting of oranges in Florida and a good correlation between price and planting of Florida grapefruit. A more significant relationship is that of price and production the following year. Your attention is directed to the effect of price on production from 1932 to 1936, a period of rising orange prices, when the price of Florida oranges increased from about 65 cents per box to about $1.30 per box. Florida production of oranges increased from 15 million boxes in 1933 to about 26 million boxes in 1937, or about 70 percent. From 1936 to 1939, a period of falling prices, the price of Florida oranges decreased from

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$1.30 per box to about 55 cents per box. Production increased from 26 million boxes in 1937 to 31 million boxes in 1940, or only 20 percent. From 1939 to 1945, a period of rising prices, the price increased from 55 cents per box to $2.35 per box and production increased from 31 million boxes in 1940 to 58 million boxes in 1945 (including loss from freeze), or almost 100 percent (Figure 4). On the average, orange production increased

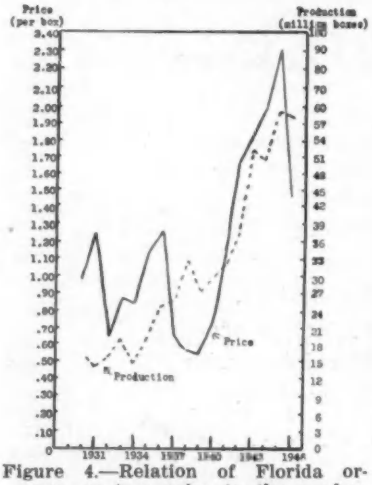

Figure 4.—Relation of Florida orange on tree price to the production the following year, 1932-1946. (Production based on Crop Estimating Board's 1st Estimate.)

at the rate of 14 percent per year during a period of rising prices and only 5 percent during a period of falling prices.

The picture is more striking with grapefruit. From 1935 to 1940, a period of falling grapefruit prices, the price of Florida grapefruit decreased from about 75 cents per box to about 35 cents per box. The production from 1935 to 1941 increased from about 15 million boxes to about 20 million boxes, or only 25 percent. From 1940 to 1944, a period of rising grapefruit prices, the price increased from 35 cents per box to about $1.55 per box, but the production increased from 20 million boxes in 1941 to 33 million boxes in 1945, or 65 percent (Figure 5). On the average, grapefruit production increased 13 percent per year during the period of rising prices, but only 3-½ percent per year during the period of falling prices. Both in the case of oranges and grapefruit production has increased about three or four times as fast during a period of rising prices as during a period of falling prices.

Such relationship between price and supply can only be accounted for by increased fertilization, water and generally improved care of groves. It is interesting to note that in California such relationship does not exist, presumably because in California the difference in the cost of supplying enough water to keep a grove alive and the optimum amount for production is very small. Because water is the most costly factor in the production of California oranges and because it must be applied to keep the grove alive, growers must also use liberal amounts of fertilizer, sprays and culture in order to keep their factors of production in balance.

If this reasoning is correct, should prices fall the production of oranges in California would be affected but little. On the other hand, notwithstanding the large planting in recent years, the increased production of Florida oranges certainly would not be expected to continue at the present high rate of recent years. Actually, there may be but little increase in production, depending on how low prices go.

A further factor which will tend to keep California production up is the high per-acre investment in California groves relative to the value of the current crop as compared to the low investment in Florida groves as compared to the value of the current crop.

In addition,, the California industry, at the moment, does not have the large acreage of young groves that must be taken care of. Almost every acre of California groves is in full production, or near full production; but in Florida there is a large acreage of young groves which will not take care of itself. Therefore, in the last ditch fight if it should come within the next two to five years, every acre of California grove is a fighting acre, but in Florida a great acreage is young and not able to take care of itself, to say nothing of contributing to the fight. It should not be inferred that this temporary situation, with respect to young groves, is permanent. In the end, the area will stay in production which has the lowest cost from the bloom to consumer, providing the demand is the same.

Because a considerable amount of the young groves are in strong financial hands, the situation is not as bad as it would be otherwise. Also because of the complete integration of the marketing and production operations in Florida, the Florida citrus industry has strength. It is also to the advantage of the Florida industry that many grove owners have other businesses. And finally because marketing firms and caretaking organizations render the services of production makes it possible, if necessary for grove owners to spend long periods of time away from their groves in order to engage in other activities.

Marketing

The layman more often attributes low prices to poor marketing than to anything else. We sometimes hear that no better job of marketing is done today than was done 30 years ago. Such is not in accordance with the facts; but I shall not labor the point for the scope of the paper is to appraise the marketing situation, not to show progress that has been made in marketing.

Marketing consists of those services involved in getting citrus fruit from the tree to the consumer. Therefore, such things as distribution as to place and time, selling, packing, processing citrus products, advertising, price flexibilities, grades and standards, transportation, market uses, storage, and many other things are involved. Time will not permit a detailed analysis of all phases of marketing; however, attention can be given to some of the more important phases.

Distribution. In the case of or-

anges the general pattern of distribution has not changed greatly in the past 20 years. New York, New Jersey, Massachusetts, Connecticut and Pennsylvania get by far the largest quantity of Florida oranges and grapefruit. On the basis of government statistics it appears that New York alone gets about as many Florida oranges as all the southern states east of the Mississippi. On first thought this seems to be poor distribution, but on a careful analysis it is good distribution. The population of New York State is about 2/3 the population of the southern states, but the per capita income is about twice as

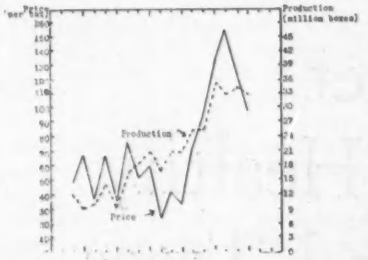

Figure 5—Relation of Florida Grapefruit on tree price to the production the following year, 1930-1946. (Production based on C. E. B. 1st estimate report.)

great. Actually the purchasing power of New York is as great as all the southern states east of the Mississippi River. According to the United States Census, retail food sales in New York State are considerably greater than in all the southern states other than Texas. In 1944 New York State purchased more "E" bonds than all southern states east of the Mississippi River. If I were selling oranges, I would choose an area where the sale of "E" bonds was high. This is what has been done for many years so far as Florida oranges are concerned.

In the case of grapefruit the pattern of distribution has changed considerably in the past 20 years. The eastern markets receive a much greater proportion of Florida grapefruit today than in the period 1925 to 1930. Obviously, the reason is the pressure of Texas fruit in the mid-western markets. In the 1934-35 season Florida had 4,399 cars on the New York auction and Texas had 27 cars. On the Chicago market Florida sold at auction 644 cars and Texas 386 cars. In 1946-47 Florida had 4,894 cars of grapefruit to sell at auction in New York City, and Texas had only 199 cars. Similar situations have taken cars. On the Chicago auction market Florida sold only 154 cars, but Texas sold 980 cars. Similar situations have taken place on the Detroit, Cleveland, Cincinnati and St. Louis auction markets. Florida has been pretty much run out of the mid-west auction markets by Texas grapefruit. This change in the distribution pattern of grapefruit is not a result of poor marketing but of poor production. Remember it avails the Florida grower nothing to contend that Florida grapefruit is as good as Texas grapefruit. The thing that counts is what the consumer thinks about the two grapefruit. The consumer spends his own money not the Florida growers' money, and in the western markets he seems to prefer Texas grapefruit at Texas prices to Florida grapefruit at Florida prices.

Let us look at the time distribution, that is the week to week or day to day movement of Florida oranges and grapefruit. An examination of government statistics reveals that the week to week movement of oranges in the case of California and Florida, and of grapefruit in the case of Texas and Florida are very much the same.

Regardless of how good the place or time distribution is as compared to Texas or California, one would be foolhardy to assume that there is no room for improvement. The problem of better distribution is both one of better merchandising by individual firms and of coordinating the efforts of all firms.

Quality. So much has been said

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about the improvement of quality (both external and internal) and maturity standards that it seems superflous to mention it again; but what I have to say is with respect to fruit which is good when it leaves groves but becomes poor in quality before it reaches consumers. We need better preservation of fruit, either through treatment, wrappers, or refrigeration; however, I hope that we shall never preserve fresh fruit so well that the trade will not be in a hurry to dispose of it before it gets old. I would hate to think of citrus fruit ever reaching the point of table salt that sits on the retailer's shelf and waits to be purchased without any effort on the part of the retailer to sell it. What is needed is a system of merchandising that will keep fresh fruit moving to the retailer each day in quantities no greater than can be moved each day when good merchandising has been carried out.

Price Flexibilities. Most students of marketing feel that there is something wrong with the system of marketing in which prices are rather rigid at the retail level but very flexible at the grower level. That is to say that lower prices to producers often are not reflected in lower prices to consumers. This, in the opinion of many, is one of our major problems. What can be done about it? We would all like to know. It will require some careful research to solve this problem.

Cost. Not only high cost of marketing at the retail level and the wholesale level concerns us, but but particularly the high cost of harvesting, packing and selling at Florida points. In 1944-45 cost data on 70 packing-houses revealed that 10 percent of the firms had costs of packing citrus fruit which averaged 18 percent lower than the average for the 70, and that 10 percent of the firms had costs which averaged 28 percent higher than the 70. Such wide variation means that the opportunity for lowering cost is good. Because costs of labor and materials are likely to remain high, the best avenue open for lowering cost is through increased efficiency.

Transportation. Freight rates have already advanced and are almost certain to advance more. Wages cannot go up without increasing freight rates. A 25 cents per box advance in freight rates costs the grower 25 cents per box. Don't be misled into believing that any increase in freight rate will be passed on to the consumer. The producer pays any increase in freight rates.

Coordinating Marketing Organiations. There is much that individual firms can do to correct some of our marketing practices. They can lower cost of packing or canning, improvement in quality and handling can be accomplished, and perhaps an improvement of price. But there are a number of things that could better be done if the marketing agencies were better coordinated. This was realized in 1894 when the Florida Fruit and Vegetable Growers' Association was organized, again in 1909 when the cooperative movement was greatly re-energized, again in 1928 when the Florida Citrus Growers' Clearinghouse Association was organized, and again in 1930 when the Farm Bureau made an effort to organize the industry. A better coordination of our marketing machinery should result in a system of feeding fruit to individual buyers on a basis that would enable them to have adequate supplies rather than burdensome sup-

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plies at times, which grow old before being consumed; it might offer some resistance to price flexibilities at the grower level, or make possible more flexibilities at the retail level; it should enable a better coordination of sales with advertising; it should lower the cost of selling materially; it perhaps could, if the need arose, establish export pools or market use pools; and last, but by no means least, it should enable a better educational process of what each individual unit needs to do to meet the over-all marketing problem.

Government Participation

Government participation has been the rule in the Florida citrus industry. It has manifested itself in such things as maturity laws, compulsory grades, advertising, marketing agreements, market news services, relief purchases, stamp programs, and school lunch programs. It would be exceedingly difficult to get along without some Government participation. Government participation programs for the future are being proposed from day to day. They include support prices, floor prices, producer subsidies, producer allotments, shipper quotas, consumer subsidies, Government loans, stamp programs, two price systems, school lunch programs, parity prices, parity income, help for Europe, and many others.

Programs such as marketing quotas, producer allotments, support prices, floor prices, and loans, have a tendency to prevent needed shifts in the industry. They usually favor established concerns whether grower or marketing, at the expense of new firms; they tend to keep the old way of doing things-after it is obsolete; they usually penalize new areas to the advantage of old areas.

Programs such as School Lunch, Stamp Plan or some modification of them, Better and More Food for the Masses, do not retard needed shifts. Programs which encourage better quality are particularly desirable. Restrictive and price programs tend to lose your markets to other areas, or in some cases, to other commodities; whereas abundant or increased demand programs and quality programs tend to encourage consumers to turn to you for fruit rather than to some other area or other product.

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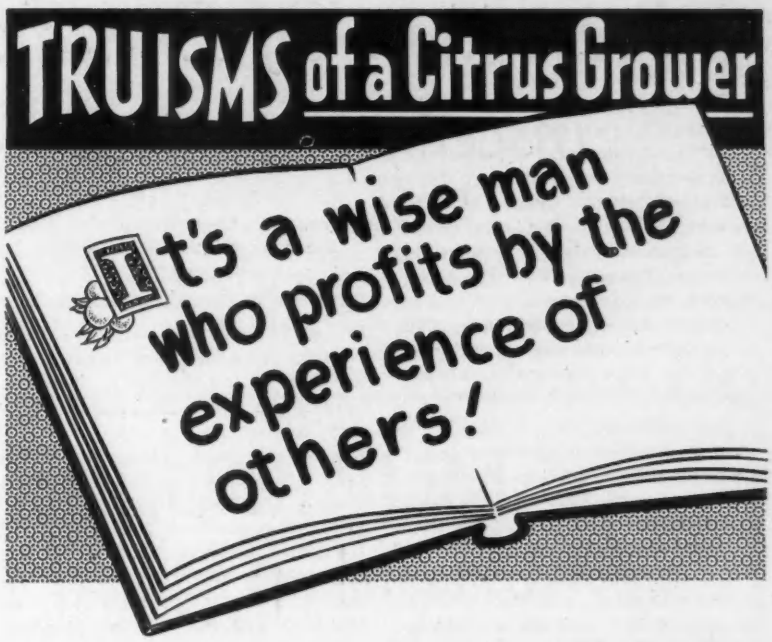

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Prevention Of Entrance Of Inscets, Pests and Diseases

ARTHUR C. BROWN
Plant Commissioner, State Plant Board, at Meeting Florida State Horticultural Society

It is unfortunate indeed that the speaker scheduled for this period, Mr. Arthur G. Watson, Assistant Collector of Customs, Tampa, Florida, is not able to be here and present a picture of foreign plant quarantine as viewed by one not primarily engaged in plant quarantine enforcement.

The activities of Customs and plant quarantine enforcement inspectors are closely related. The former are responsible for the regulation of entry of foreign commodities, largely from a revenue angle, while the latter are responsible for regulation of entry of plants and plant products to protect the agricultural interests of the United States from economic losses, sometimes of serious proportions, likely to follow entry of affected plants, fruits, etc., from foreign countries. However, the power and authority of Customs far surpasses that of plant quarantines. As a matter of fact, rigid enforcement of Customs regulations would deny plant quarantine inspectors the right to board any newly arrived air- or watercraft, or even inspect plants until after Customs had completed entry of the craft and officially disposed of its cargo. It is apparent that a procedure of this nature would seriously interfere with the efficient application of plant quarantine regulations.

Mr. Watson, a grove owner himself, has been intensely interested in foreign plant quarantine enforcement since the inception of this branch of the Plant Board's activities in 1916, and has done everything within his authority to provide for the closest cooperation of Customs inspectors. This has resulted in a situation whereby the number of plant quarantine inspectors at Florida ports of etnry totals not the number of Plant Board employees assigned to any particular port, but the combined number of Plant Board and Customs inspectors at that place. This happy combination of effort has been the envy of other state and federal plant quarantine officials.

The 1947 legislature provided the funds requested by the Plant Board for operations during the biennium 1947-49. It is believed that the Board's Nursery and Quarantine Departments are operating effectively. This is true of the Grove Inspection Department insofar as the present personnel is concerned. However, it has been most difficult to find a sufficient number of qualified individuals to fill all of the positions provided for in the grove inspection budget. If any of you know of anyone familiar with insects and diseases and their control and well informed as to citrus culture who may be interested in obtaining employment with the Board's Grove Inspection Department, please refer him to the Plant Commissioner at Gainesville.

You are all interested in the possibility of entry of destructive citrus pests, particularly from foreign countries. Federal plant quarantines prohibit entry of citrus trees, budwood, etc., from foreign countries. Citrus fruits are prohibited from most foreign countries. The Board's regulations prohibit entry of all citrus trees, budwood, etc., from other states in the Union. Lemons only are permitted entry — after treatment designed to eliminate risk of entry of brown rot — from California, and treated lemons and oranges are permitted from Arizona. All citrus fruits from other states are denied entry into Florida.

It is easy to promulgate regulations seeking to prohibit entry of certain commodities; it is far more difficult to enforce such regulations, particularly domestic quarantines. I do not believe that any of you will be surprised when it is stated that the tremendous development of motor vehicle transportation has made en-

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forcement of domestic plant quarantines, except in well planned and administered eradication projects, almost impossible. Therefore, so long as there persists in any part of the United States any major insect or disease affecting citrus the citrus industry of Florida is in jeopardy.

All of you know that as a result of state-federal eradication activities official announcement was made about fifteen years ago of the eradication of citrus canker from Florida, Alabama and Mississippi. Similar announcement has never been made with respect to eradication in Louisiana and Texas, where federal-state eradication campaigns were in effect until about 1944. At that time lack of appropriations made necessary discontinuance of federal participation. Louisiana and Texas officials have, to the best of their ability, continued the projects. The situation in the two states at the time federal aid was discontinued was essentially as follows:

Citrus canker infected trifoliata trees had been found in the old Satsuma area in the vicinity of Galveston and Houston, Texas, in 1943, and in one planting located south of New Orleans, La., in 1940. (No citrus canker has been reported from the Rio Grande Valley since 1917.)

The Texas legislature in 1947 appropriated $40,000 for completion of citrus canker eradication in that state. Although the Bureau of Entomology and Plant Quarantine has not been able to obtain Congressional appropriations for canker eradication, Bureau officials have been able to allot some $15,000 from other sources, and cooperative eradication activities are again under way in Texas, but not in Louisiana.

Another development of which you should be informed is the rapid movement northward through Mexico of the spiny citrus whitefly, or blackfly (**Aleuro-canthus woglumi Ashby,**) a pest that has demonstrated its destructive nature in Cuba and the Bahamas, where citrus trees were either killed or severely injured. The infestation in Mexico has aroused the apprehensions of citrus growers in Texas, Arizona and California, who fear that unless the northward spread is checked blackfly will invade these states. The California Department of Agriculture has made arrangements with officials of the Mexican government whereby California entomologists will go into the infested areas in Mexico and attempt to bring blackfly under control.

This insect is now effectively controlled in Cuba and the Bahamas by parasites and predators introduced from India by our federal Department of Agriculture. Incidentally, your State Plant Board was largely responsible for interesting authorities in introducing these natural enemies.) We are informed that attempts to introduce parasites into Mexico have not been successful. We are not informed as to whether this attempt was made by specialists of the U. S. Department of Agriculture or by growers in Mexico. It is imperative that a determined attempt to control blackfly in Mexico be made before it spreads into the southwestern states. Once established there, it is bound to spread eastward and eventually into Florida.

You will be interested also in contemplated changes in the manner of inspection of passengers and baggage from foreign countries now being considered by the Bureau of Entomology and Plant Quarantine, the federal agency responsible for enforcement of foreign plant quarantines. Arrangements have already been made for the inspection at

(Continued on page 20)

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Reports Of Our Field Men . . .

WEST CENTRAL FLORIDA
E. A. (Mac) McCartney

Conditions in this territory are very much the same as when we made our last Lyonizer report. Fruit prices are about the same, but there seems to be a general feeling of optimism that this condition will improve after the first of the year, especially in the case of oranges. Weather conditions have been good on the whole but we could use some cool weather to good advantage. The vegetable sections in this territory have been experiencing favorable conditions in recent weeks. Climatic conditions have been just about perfect and prices on all vegetable crops have been good. While the watermelon acreage will probably be somewhat less this year than was planted during the past season, the growers are anticipating a good yield because there is plenty of moisture at this time and if rains continue warm weather is to be expected and the crop should grow off in fine shape with an increase in yield per acre.

POLK COUNTY
J. M. (Jim) Sample

We still haven't had enough cool weather to do very much for the quality of fruit and rains have continued to be very general. During the last weeks of December we had extremely heavy shipments of fruit to both the packers and canners. There will no doubt be a lull in the shipments of fresh fruit to market following the Christmas holidays and most growers are feeling a little optimistic about prices after the first of the year. Groves throughout this territory are in excellent condition and should set a nice crop of fruit for the coming year. The fall fertilizer application has been completed, and most growers will come back in the spring with an application of topdresser. There is a great deal of talk about producing better quality fruit in seasons to come and are placing less emphasis on the quantity. We think this is a very important move on the part of the growers.

HILLSBOROUGH & PINELLAS COUNTIES
C. S. (Charlie) Little

We have finished our fall fertilization of fertilizer. Scale insects and rust mite are well under control. Fruit is not moving too heavily, and growers are hoping that conditions will improve shortly after the first of the year. There has been a great deal of talk during the past few years about the advertising of Florida citrus fruit. We feel that this particular territory, and we hope that other sections of the state have done the same, has done as much to advertise Florida fruit as any program ever devised. We have sent thousands of packages of fruit out of the state from this area as Christmas gifts and with most people taking a great deal of pride in sending their friends a box of GOOD fruit, we feel that the advertising value is of an inestimable value. The individual package shipper is doing a great deal to save the reputation of Florida fruit and we want to offer him our sincere congratulations.

NORTH CENTRAL FLORIDA
V. E. (Val) Bourland

We are in the middle of our fall fertilizer application. Of course there is some cutting in the amount of fertilizer that has been used during the past few years but this is probably as it should be as our quality has not been up to par for the past year or two, and growers feel that with less tree feeding that quality will be improved during the next season. There is no question but what it is imperative that we grow better fruit for the consuming public than we have in the last year or two. We have been plagued with rust mite and scale insects this fall, but at the present time we have both of these insects under control. We do need some cool weather to help in conserving the quality of citrus fruits, and rains have been so plentiful that we accredit a great deal of the slow maturity to this source. Vegetable crops have been good. They have had ample moisture, and the quality and yield have been satisfactory, thus enabling the individual grower to realize a profit on what he has produced.

SOUTHWEST FLORIDA
Eaves Allison

The individual citrus grower has been somewhat despondent so far during the present season, but his spirit has not dampened and is looking forward to the spring season with a great deal of optimism. This is particularly true in the case of the orange grower, and while the grapefruit grower feels less encouraged, he still maintains that conditions will be greatly improved. The vegetable growers are having a very successful season with prices on all vegetable crops being within a satisfactory price range. They had many disappointments during the early part of the season, but in recent weeks weather conditions have been most favorable and yields and quality have greatly improved.

SOUTH POLK, HIGHLANDS & HARDEE COUNTIES
R. L. (Smokie) Padgett

We have given a great deal of thought as to what we could report this month, but if you will read our last report then you have an idea of the situation. We are moving quite a heavy tonnage of all varieties of fruit. This going to both the packing houses and canneries, but in either case there is a great deal of hesitancy with the idea that the situation will improve after the holiday season.. There have been some growers that failed to make an application of fertilizer during the fall season, and this was a result of continued plentiful rains. However these growers are planning to come in with an early spring application, and follow with the usual summer application.
In spite of the many adversities that we have had this fall there is a general feeling of optimism among growers and with this in mind I am sure that I can predict that the Florida citrus industry in this section will come through their troubles in very good shape.

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THE CITRUS SITUATION

(Continued from page 15)

What Abut The Individual Grower?

Some growers are rightly concerned over the future. Too often we are inclined to think that we are helpless to do anything alone and that unless the industry is awakened to action all will be lost. The growers' individual problem is to do the job better than the other fellow. Since 1942 we have compiled data on prices received for fruit and cost of marketing fruit at the shipping point for various marketing firms. I want to give a few results from these studies as reported in Florida Agricultural Experiment Station Bulletin No. 386. From the 1925-26 season to the 1939-40 season, one firm, when weighted to reflect proper differential for types of fruit and varieties of fruit, received for the 15-year period approximately 21 percent higher f. o. b. prices than the average. During the same period a few firms each year had costs which were lower by 20 percent than the average. The Florida Agricultural Experiment Station has compiled the cost of producing citrus fruit by the acre and by the box for a large number of groves for about 20 years. If you will look over these data you will be amazed at the difference in cost among growers.

Between the average price received for fruit and the price received by the highest 10 percent there is enough profit to keep any grower in business. The difference in the average cost of producing fruit and the lowest 10 percent is sufficient to keep any grower in business. Growers affiliated with the firms in the lowest 10 percent of cost of packing should have no trouble of prospering in business.

PREVENTION OF ENTRANCE OF INSECTS, PESTS AND DISEASES

(Continued from page 17)

Honolulu of passengers and baggage from the Orient, New Zealand and Australia, en route to the continental United States via Honolulu. Following the inspection at Honolulu, passengers will be allowed, after arrival on the mainland, to proceed to their destinations without further inspections. Now under consideration is the inspection at San Juan, Puerto Rico, of passengers and baggage destined for the United States, and similar inspection at Mexico City, Mexico, of passengers entering the United States through that country.

The thought behind this inspection at foreign points instead of at ports of entry is an excellent one. Such inspection, together with confiscation of contraband or pest-ridden plants or fruits, should prevent the entry of such material into this country. But there may be some question as to the wisdom of assigning to individuals located a thousand or more miles away the important task of protecting Florida's agricultural and horticultural interests from invasion by alien plant pests. Such inspection must be performed by federal inspectors. These federal inspectors will be charged with the responsibility of protecting the entire United States, and not one particular state or section. Their procedure must of necessity be a uniform one. Unfortunately, because of the wide diversity of climate and flora in the United States, uniformity of inspection of commodities moving into this country is not practical. It is for this reason that the State Plant Board has supplied funds and personnel for practically all foreign plant quarantine enforcement in Florida since 1916. Your Plant Board has protested against the substitution of inspection at San Juan, Puerto Rico, for inspection with the Board and growers in Florida before making effective any change in the current inspection practices.

It is my suggestion that the Florida State Horticultural Society give thought to the desirability of adopting resolutions addressed to the appropriate federal authorities on the following subjects:

1. Need for federal appropriation to carry on state-federal citrus canker activities in Louisiana and Texas until such time as officials feel justified in making announcement that the disease has been eradicated from those states.

2. Need for federal cooperation with Mexican authorities in the control or eradication of blackfly in Mexico.

3. The need for conferences between the State Plant Board and growers' organizations in Florida on one hand, and officials of the Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture on the other, before any change is made in the present manner of inspecting passengers and baggage from Puerto Rico.

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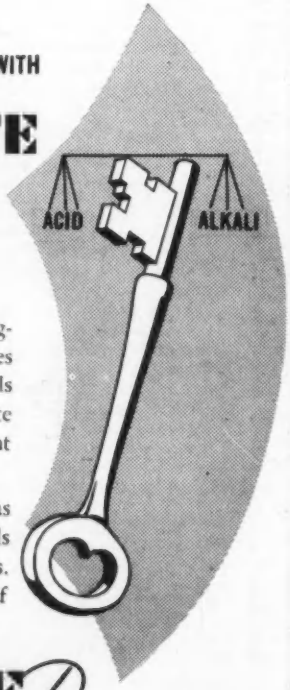

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Trends In Recent Grove Plantings In Florida...

(Concluded from last month)

An attempt was made to determine whether or not new plantings of citrus trees are being made in greater volume in some citrus sections of the state than in other sections, and the trends of new plantings in these sections. The results for oranges are shown in Chart 7. In this chart annual plantings of all varieties of oranges since 1928-29 are plotted for 3 divisions of the state; these 3 divisions being the Inland Counties, Gulf Coast Counties, and East Coast Counties. Throughout this period greater numbers of trees were being planted in the Inland Counties than in the other divisions, since this was by a considerable margin the largest of the 3 divisions of the state. However, there appears also to have been a trend for larger and larger proportions of total plantings of oranges to be made in the Inland Counties. East Coast and Gulf Coast Counties maintained about their same relationship to each other throughout the period. During the 5-year period, July 1928-June 1933, 61 percent of new plantings of orange trees were in Inland Counties. Thus the trend toward Inland Counties was not outstanding, but was quite noticeable.

Similar information for grapefruit is shown in Chart 8. The most outstandng features of ths chart seem to be the decreasng proporton of plantngs in Gulf Coast Counties, and the increasing proportion of total plantings in East Coast Counties. During the 5-year period, July 1928-June 1933, 28 percent of total plantings of grapefruit trees were in Gulf Coast Counties, while during the 5-year period, July 1941-June 1946, only 18 percent of the total were in these counties. During the earlier 5-year period, 30 percent of total grapefruit plantings were in East Coast Counties, while during the latter period 40 percent of total plantings were in that division of the state. Plantings in Inland Counties constituted 41 percent of total grapefruit plantings during the earlier period and 42 percent during the latter period.

To summarize: We have pointed out that world citrus production has been increasing rapidly during the past quarter - century, and is on a very high plane. However, certain areas which are normally important producers of citrus fruits have not been making their maximum possible contributions to the world supply, due to the fact that they were dependent upon export markets which have been largely shut off from them due to war conditions. As soon as the densely populated areas of northern Europe can reconvert to normal peacetime industrial

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production and employment, they will doubtless again become important markets for citrus fruits, but the citrus production areas which formerly furnished the bulk of the supply on these markets, namely, Spain, Italy, Palestine, Brazil, and South Africa, will likely come back into higher production with amazing speed when these markets are again available. The extent of recent plantings in these countries is not clear from records available; but even though new plantings may be negligible, as we are led to believe, old groves will respond rapidly to good cultural practices stimulated by consumer demand for fruit.

In the United States, available records of new citrus plantings in other areas than Florida during the past 5 years indicate that Florida's citrus acreage is increasing at a much more rapid rate than elsewhere. It is because of the highly productive condition of Florida's bearing groves, due primarily to wartime fruit demands, together with the potential production from additional acreages in the immediate future, that Florida citrus has been singled out by national authorities as an outstanding example of an agricultural industry that would suffer severely by any reduction in consumer purchasing power. Certainly the Florida citrus industry has a tremendous interest in the future of industrial employment and purchasing power, since high levels for these are essential for a high level of demand although it is by no means certain that even full employment will be sufficient to guarantee profitable movement of the volume of fruit which may be forthcoming.

Since there is little that the citrus industry itself can do in the way of maintaiining high general levels of industrial employment and purchasing power, what steps can it take to contribute to the greatest measure of prosperity of which it is capable in the years which lie ahead?

Some important steps which are to be recommended for consideration are as follows:

1. By advertising and other methods of sales promotion, work toward the introduction of Florida citrus fruits into more domestic markets, and the increase in per capita consumption of citrus in all markets. School lunch programs should be encouraged in all public schools, with citrus products taking a prominent place in these programs.

2. Increase the proportion of citrus used for processing and be continuously on the alert for new citrus food and by-products. This will diversify the industry and will distribute the seasonal supply more uniformly through the entire year.

3. Make every effort to develop a strong export trade, particularly with processed commodities.

4. Encourage the keeping of production records of costs and returns, and the use of these records in planning for greater efficiency in production.

5. Finally, increase the use of records of costs of picking, hauling packing, processing, transportation, and selling to determine the most efficient methods for each operation.

Faithful adherence to this program appears to be the most effective means available to citrus producers and the industry generally to "condition" the industry for whatever situations may arise. This should minimize losses or distress in case depression conditions should develop, or lead to greatest profits in case of normal conditions.

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